2.

$f(x) \approx P(x) = 8 - 4(x-3) + 5(x-3)^2 - 7(x-3)^3 + 9(x-3)^4 - 6(x-3)^5$

a) $f(3) = 8$ $\quad 9 = \frac{f^{4}(3)}{4!}$

$f^{4}(3) = 9 \cdot 4!$

$f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 \ldots$

$a = 3$

b) 3^{rd} deg $f'(x) = -4 + 10(x-3) - 21(x-3)^2 + 36(x-3)^3$

c) 6^{th} deg $\int_3^x f(t)\,dt = 8(x-3) - \frac{4}{2}(x-3)^2 + \frac{5}{3}(x-3)^3 - \frac{7}{4}(x-3)^4 + \frac{9}{5}(x-3)^5 + \frac{6}{6}(x-3)^6$

d) $f(4) = ?$ no, only approximate

Mar 14-8:58 AM

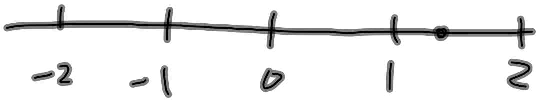
$$\int_1^x \frac{\sin t}{t}\,dt = \int_1^x 1 - \frac{t^2}{3!} + \frac{t^4}{5!} \ldots dt$$

$$\int_1^x \sin t\,dt = -\cos t \Big|_1^x = -\cos x + \cos 1$$

$$\frac{\sin t}{t} = \frac{t}{t} - \frac{t^3}{t \cdot 3!} + \frac{t^5}{t \cdot 5!} \ldots$$

$$= 1 - \frac{t^2}{3!} + \frac{t^4}{5!}$$

Mar 14-9:39 AM



$$\frac{p}{q}$$

$\sqrt{2} \approx 1.414...$

Mar 14-9:46 AM

Review 11 optimization

1. Draw a pic, label variables, constants.
2. Identify the thing you're optimizing
3. get an equation(s)
4. find candidates
    1. $f'(x) = 0$ } critical pts
    2. $f'(x) = *$ } critical pts
    3. endpts
5. justify
    1. 1st der test: signgraph & sentence
    - or 2. 2nd der test (☺) or (☹)
    - or 3. evaluate all candidates
6. answer the question with proper language

"is" vs "at"

y x

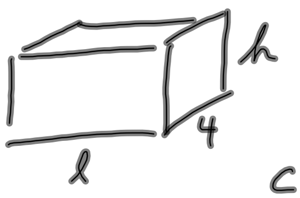
Mar 14-9:51 AM

construct a tank. rectangular base. open top

width = 4 m volume = $36\ m^3$ base: $\frac{\$10}{m^2}$ sides: $\frac{\$5}{m^2}$

what cost of the least expensive tank?

Mar 14-10:06 AM



$36 = 4lh \quad h = \frac{9}{l}$

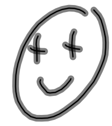
$c = 10\cdot 4l + 5\cdot 2\cdot lh + 5\cdot 2\cdot 4h$

$c = 40l + 10l\cdot\frac{9}{l} + 40\,\frac{9}{l}$

$c = 40l + 90 + \frac{360}{l}$

$c' = 40 - \frac{360}{l^2} = 0 \qquad l = 3$

$c'' = \frac{720}{l^3}\Big|_{l=3} > 0$



min cost $c(3) = 40\cdot 3 + 90 + \frac{360}{3} = 120 + 90 + 120$

$= 330$

Mar 14-10:21 AM